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(54)【考案の名称】 耐熱性積層コンベアベルト

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(57)【実用新案登録請求の範囲】

【請求項1】 耐熱性繊維基布に弗素樹脂を含浸、乾燥、焼結した補強層と、この補強層上に形成され、耐熱性繊維からなる伸縮性を付与した基布に弗素樹脂を含浸、乾燥、焼結した耐摩耗層とを具備することを特徴とする耐熱性積層コンベアベルト。

【請求項2】 前記耐熱性繊維が、ガラス繊維、炭素繊維、アラミド繊維、芳香族アリレート繊維のいずれかである請求項1記載の耐熱性積層コンベアベルト。

【請求項3】 前記耐摩耗層の耐熱性繊維が波状もしくは 10
はコイル状の伸縮性を付与した短繊維で構成された不織布である請求項1記載の耐熱性積層コンベアベルト。

【請求項4】 前記耐摩耗性層の耐熱性繊維がニット織りされて伸縮性を付与した織布であることを特徴とする請求項1記載の耐熱性積層コンベアベルト。

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【請求項5】 前記補強層中の弗素樹脂が全重量に対して80重量%以下である請求項1記載の耐熱性積層コンベアベルト。

【請求項6】 前記耐摩耗層中の弗素樹脂が全重量に対して80重量%以下である請求項1記載の耐熱性積層コンベアベルト。

【考案の詳細な説明】

【0001】

【産業上の利用分野】この考案は耐熱性積層コンベアベルトに関し、特に紙送り工程に用いられる耐熱性積層コンベアベルトに関する。

【0002】

【従来の技術】従来、例えば紙送り工程に使用されるコンベアベルトとしては、同じベルト基材をPFAフィルムを介して積層したものが知られている。また、高強度

を必要とする用途によって2層以上に積層したコンベアベルトが使用されている。

【0003】図4は、従来の積層コンベアベルトの一例を示す。図中の1、2はPFAフィルム3を介して積層された耐熱性繊維布であり、例えばガラス繊維、炭素繊維、アラミド繊維、芳香族アクリレート繊維で織った織布である。前記耐熱性繊維布は平織、朱子織、綾織等に織られる。また、その少なくとも片面に例えばテトラフルオロエチレン樹脂からなる弗素樹脂で構成されている。このような弗素樹脂複合体では、弗素樹脂を有しているために優れた耐薬品性、耐熱性、非粘着性、耐摩耗性を有する。また、高張力下で使用する場合、単味のベルトを使用することがあるが、2層以上に積層して使用する。

【0004】

【考案が解決しようとする課題】しかしながら、同じ織り方で織った耐熱性繊維織布を弗素樹脂ディスパージョンに含浸、乾燥、焼結した補強層と耐摩耗層を熱圧着した2層のベルト状にした場合、補強層と耐摩耗層の周長の差により、耐摩耗層は補強層の伸び縮みに追従できなくなり、補強層と耐摩耗層の界面のせん断応力により、あるいは耐摩耗層自体のせん断応力により耐熱繊維織布と弗素樹脂層が界面剥離をきたし、本来の弗素樹脂の特性が損なわれ、ベルトの寿命が短くなるという問題点を有する。

【0005】この考案は上記事情を考慮してなされたもので、伸縮性を付与した耐摩耗層を設けることにより、本来の弗素樹脂の特性が損なうことなく寿命を長くしえる耐熱性積層コンベアベルトを提供することを目的とする。

【0006】

【課題を解決するための手段】この考案は、耐熱性繊維基布に弗素樹脂を含浸、乾燥、焼結した補強層と、この補強層上に形成され、耐熱性繊維からなる伸縮性を付与した基布に弗素樹脂を含浸、乾燥、焼結した耐摩耗層とを具備することを特徴とする耐熱性積層コンベアベルトである。

【0007】この考案において、耐熱性繊維としては、ガラス繊維、炭素繊維、アラミド繊維、芳香族アクリレート繊維が挙げられ、このうち特にガラス繊維やアラミド繊維が望ましい。

【0008】この考案において、弗素樹脂としては、ポリテトラフルオロエチレン(PTFE)、テトラフルオロエチレン-パーフルオロアルキルビニルエーテル共重合体(PFA)、テトラフルオロエチレンヘキサフルオロプロピレン共重合体(FEP)を単味あるいは2種以上を混合したものを用いることができる。また、弗素樹脂の中に、より耐摩耗層の摩耗を向上させるため、耐熱性の充填材を混合しても良い。

【0009】この考案において、織布の織り方としては

平織、朱子織、綾織があるが、同じ織り方で織った織布に、弗素樹脂を含浸、乾燥、焼結した複合材をPFAフィルムを介し、熱圧着によって2層にしてベルト状にしたものは、補強層と耐摩耗層の周長の差により、特に耐摩耗層の繊維織布と弗素樹脂の界面がせん断力により界面剥離が起こる。従って、2層のベルト状にした場合、同じ織り方同士、つまり平織-平織、朱子織-朱子織、綾織-綾織の組合せよりも、補強層と耐摩耗層の組合せは平織-ニット織、朱子織-ニット織、綾織-ニット織の組合せが好ましい。図2はニット織の説明図であり、図中の11はニット織基材を示す。

【0010】この考案において、耐摩耗層は、耐熱性の短繊維が波状のもの、あるいは短繊維自体がコイル状になったものを不織布にし、弗素樹脂を含浸、乾燥、焼結し耐摩耗層を形成するものも好ましい。

【0011】この考案において、補強層中の弗素樹脂の含有率は、全重量に対して80重量%以下、好ましくは30~60重量%である。ここで、含有率が80重量%を越えると耐屈曲性が損なわれ、30重量%未満の場合織布の目ずれが発生する恐れがある。一方、耐摩耗層中の弗素樹脂の含有率は、全重量に対して80重量%以下、好ましくは30~60重量%である。ここで、80重量%を越えると本考案が意図している補強層の伸びに追従できなくなり、伸縮性及び屈曲性を損うことになり、30重量%未満の場合ニット織事態の摩耗が促進され、またニット織自体の形状維持を損う恐れがある。

【0012】

【作用】この考案によれば、耐摩耗層の耐熱繊維をニット織あるいは波状、コイル状の不織布にすることにより、耐摩耗層に伸縮性をもたせ、もって従来の同じ織構成で作製した積層ベルトに比べ屈曲性を格段と向上し、寿命を向上できる。

【0013】

【実施例】以下、この考案の一実施例を図1(A)、(B)を参照して説明する。ここで、図1(A)は耐熱性積層ベルトの平面図、図1(B)は図1(A)のX-X線に沿う断面図を示す。図中の21は、耐熱性繊維基布にPTFEを含浸、乾燥、焼結してなる厚み0.5mmの補強層である。この補強層21は、芳香族アラミド繊維(商品名: テクノール、帝人株式会社製)を平織にし、その織布をPTFEディスパージョン(商品名: テフロンT-30J、三井・デュボンフロケミカル株式会社製)に含浸させた後、乾燥し、380℃で焼結し、この工程を数回繰り返すことにより得た。

【0014】前記補強層21上(いわゆる外周側)には、厚み25μmのPFAフィルム22を介して厚み0.5mmの耐摩耗層23が形成されている。この耐摩耗層23は、アラミド繊維(商品名: テクノール、帝人株式会社製)をニット織にし、その織布をPTFEディスパージョン(商品名: テフロンT-30J、三井・デュボンフロケ

ミカル株式会社製)に含浸させた後、乾燥し、380℃で焼結し、この工程を数回繰り返すことにより得た。前記補強層21と耐摩耗層23とは、補強層21を下(いわゆる内周側)、耐摩耗層23を上(いわゆる外周側)にし、その層間に前記PFAフィルム22を介在させ、温度380℃、プレス圧0.98MPaで上下層を熱圧着し、上層耐摩耗層は付き合わせによってエンドレスとした。

【0015】しかし、上記実施例に係る耐熱性積層コンベアベルトは、芳香族アラミド繊維基布にPTFEを含浸、乾燥、焼結した補強層21と、この補強層21上にPFAフィルム22を介して形成され、アラミド繊維をニット織した基布にPTFEを含浸、乾燥、焼結し、伸縮性を付与した耐摩耗層23から構成されている。従って、従来の同じ織構成で作製した積層ベルトに比べ屈曲性を格段と向上し、寿命を向上できる。事実、上記実施例に係る積層ベルトを温度180℃の雰囲気、荷重1.5kN/cm幅、ベルト走行スピード800m/分で図3のように走行させ、破断屈曲疲労回数を調べた。但し、図3において、31、32はコンベアベルト33が掛けられた駆動ロール、34は荷重加圧ロールを示す。その結果、破断屈曲回数は49856回であった。一方、耐摩耗層織布が*

*平織である以外は実施例と同様に積層ベルトを作製し、破断屈曲数を調べた結果、465回であった。これにより、この考案が従来と比べ優れていることが明らかである。

【0016】

【考案の効果】以上詳述した如くこの考案によれば、伸縮性を付与した耐摩耗層を設けることにより、本来の弗素樹脂の特性が損なうことなく寿命を長くしえる耐熱性積層コンベアベルトを提供できる。

10 【図面の簡単な説明】

【図1】この考案に一実施例に係る耐熱性積層コンベアベルトの説明図であり、図1(A)は平面図、図1(B)は図1(A)のX-X線に沿う断面図。

【図2】この考案に係るニット織の説明図。

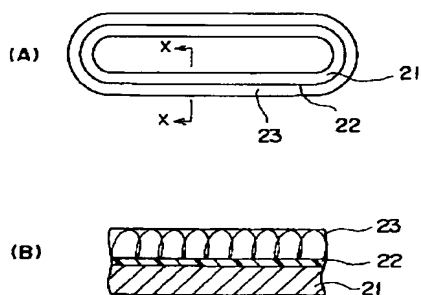
【図3】図1の耐熱性コンベアベルトの走行試験の説明図。

【図4】従来の積層コンベアベルトの説明図。

【符号の説明】

21…補強層、22…PFAフィルム、23…耐摩耗層、31、32…駆動ロール、33…コンベアベルト、34…荷重加圧ロール。

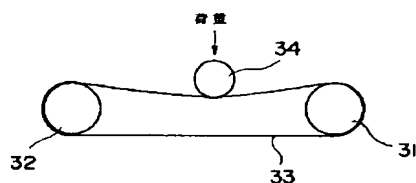
【図1】



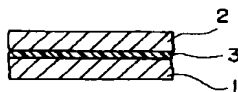
【図2】



【図3】



【図4】



フロントページの続き

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CLAIMS

(57) [Utility model registration claim]

[Claim 1] The heat-resistant laminating conveyor belt characterized by providing the antifriction layer which dried [sank it in and] and sintered fluororesin to the base fabric which gave the elasticity which is formed on the reinforcement layer which dried [sank it in and] and sintered fluororesin to the heat-resistant fiber base fabric, and this reinforcement layer, and consists of heat-resistant fiber.

[Claim 2] The heat-resistant laminating conveyor belt according to claim 1 said whose heat-resistant fiber is a glass fiber, a carbon fiber, an aramid fiber, or aromatic series ant rate fiber.

[Claim 3] The heat-resistant laminating conveyor belt according to claim 1 which is the nonwoven fabric which consisted of staple fibers with which the heat-resistant fiber of said antifriction layer gave the elasticity of wavelike or a coiled form.

[Claim 4] The heat-resistant laminating conveyor belt according to claim 1 characterized by being the textile fabrics with which knitting textile of the heat-resistant fiber of said wear-resistant layer was carried out, and it gave elasticity. [Claim 5] The heat-resistant laminating conveyor belt according to claim 1 whose fluororesin in said reinforcement layer is 80 or less % of the weight to total weight.

[Claim 6] The heat-resistant laminating conveyor belt according to claim 1 whose fluororesin in said antifriction layer is 80 or less % of the weight to total weight.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed explanation of a design]

[0001]

[Industrial Application]

Especially this design is related with the heat-resistant laminating conveyor belt used for a paper feed process about a heat-resistant laminating conveyor belt.

[0002]

[Description of the Prior Art]

What carried out the laminating of the same belt base material through the PFA film as a conveyor belt used for the conventional, for example, paper feed, process is known. Moreover, the conveyor belt which carried out the laminating by the application which needs high intensity more than two-layer is used. [0003]

Drawing 4 shows an example of the conventional laminating conveyor belt. 1 in drawing and 2 are the heat-resistant fiber cloth by which the laminating was carried out through the PFA film 3, for example, are the textile fabrics woven for a glass fiber, a carbon fiber, an aramid fiber, and aromatic series ant rate fiber. Said heat-resistant fiber cloth is woven by plain weave, satin, twill, etc. Moreover, it consists of fluororesin which becomes at least the one side from tetrafluoroethylene resin. It has the chemical resistance which was excellent in such fluororesin complex since it had fluororesin, thermal resistance, non-adhesiveness, and abrasion resistance. Moreover, although the belt of the single taste may be used when using it under high tension, it is used, carrying out a laminating more than two-layer.

[0004]

[Problem(s) to be Solved by the Device]

When the reinforcement layer which sank into fluororesin dispersion, dried and sintered the heat-resistant fiber textile fabrics woven by the same weave, and an antifriction layer are made into the shape of a two-layer belt which carried out thermocompression bonding, however, according to the difference of the perimeter of a reinforcement layer and an antifriction layer It becomes impossible for an antifriction layer to follow expansion and contraction of a reinforcement layer. With the shearing stress of the interface of a reinforcement layer and an antifriction layer Or heat-resistant fiber textile fabrics and a fluororesin layer cause interfacial peeling with the shearing stress of the antifriction layer itself, the property of original fluororesin is spoiled, and it has the trouble that the life of a belt becomes short.

[0005]

This design was made in consideration of the above-mentioned situation, and it aims at offering the heat-resistant laminating conveyor belt which can lengthen a life by preparing the antifriction layer which gave elasticity, without the property of original fluororesin spoiling.

[0006]

[Means for Solving the Problem]

This design is a heat-resistant laminating conveyor belt characterized by providing the antifriction layer which was formed on the reinforcement layer which dried [sank it in and] and sintered fluororesin to the heat-resistant fiber base fabric, and this reinforcement layer, dried [sank it in and] and sintered fluororesin to the base fabric which carried out Nitto of the heat-resistant fiber, and gave elasticity.

[0007]

In this design, as heat-resistant fiber, a glass fiber, a carbon fiber, an aramid fiber, and aromatic series ant rate fiber are especially mentioned, among these a glass fiber and an aramid fiber are desirable.

[0008]

In this design, what mixed the single taste or two sorts or more for the polytetrafluoroethylene (PTFE) and tetrafluoroethylene-perfluoroalkyl vinyl ether copolymer (PFA) and the tetrafluoroethylene hexafluoropropylene copolymer (FEP) can be used as fluororesin. Moreover, in order to raise wear of an antifriction layer more in fluororesin, a heat-resistant filler may be mixed.

[0009]

The interface of the fiber textile fabrics of an antifriction layer and fluororesin happens according to the

difference of the perimeter of a reinforcement layer and antifriction layer, and, especially as for the thing which intervened the PFA film in the composite which sank fluororesin into the textile fabrics woven by the same weave although there were plain weave, satin, and twill as weave of textile fabrics in this design, dried, and was sintered, made two-layer by thermocompression bonding, and was made into the shape of a belt, interfacial peeling happens according to shearing force. Therefore, when it is made the shape of a two-layer belt, the combination of a reinforcement layer and an antifriction layer has the combination of plain weave-Nitto, satin-Nitto, and twill-Nitto more desirable than the combination of the same weave, i.e., plain weave-plain weave, plain weave-satin, and twill-twill. Drawing 2 is the explanatory view of Nitto and 11 in drawing shows the Nitto base material.

[0010]

As for an antifriction layer, in this design, what a heat-resistant staple fiber uses as a nonwoven fabric a wave-like thing or the thing which the staple fiber itself consisted spring-like of, sinks in, dries and sinters fluororesin, and forms an antifriction layer is desirable.

[0011]

In this design, the content of the fluororesin in a reinforcement layer is 30 – 60% preferably 80% or less. Here, if content exceeds 80%, flexibility will be spoiled, and when it is less than 30%, there is a possibility that an eye gap of textile fabrics may occur. On the other hand, the content of the fluororesin in an antifriction layer is 30 – 60% preferably 80% or less. Here, there is a possibility of it becoming impossible to follow the elongation of the reinforcement layer whose intention this design has, and elasticity and flexibility being spoiled when 80% is exceeded, and wear of the Nitto situation being promoted less than 30% of case, and spoiling configuration maintenance of Nitto itself.

[0012]

[Function]

According to this design, by using the heat-resistant fiber of an antifriction layer as the nonwoven fabric of the shape of Nitto or a wave, and a spring, compared with the laminating belt which gave and had elasticity in the antifriction layer and was produced by the same conventional *****, flexibility is improved markedly, and a life can be improved.

[0013]

[Example]

Hereafter, one example of this design is explained with reference to drawing 1 (A) and (B). Here, the sectional view where drawing 1 (A) meets the top view of a heat-resistant laminating belt, and drawing 1 (B) meets X-X-ray of drawing 1 (A) is shown. 21 in drawing is thickness which dries [sinks it in and] and comes to sinter PTFE to a heat-resistant fiber base fabric. It is a 0.5mm reinforcement layer. After making the aromatic series aramid fiber (trade name: theque NORA, Teijin, Ltd. make) into plain weave and infiltrating those textile fabrics into PTFE dispersion (trade name: Teflon T-30J, Dupont-Mitsui Fluorochemicals, Inc. make), it dried, and this reinforcement layer 21 was sintered at 380 degrees C, and was obtained by repeating this process several times.

[0014]

On said reinforcement layer 21, the antifriction layer 23 with a thickness of 0.5mm is formed through the PFA film 22 with a thickness of 25 micrometers. This antifriction layer 23 makes Nitto an aramid fiber (trade name: theque NORA, Teijin, Ltd. make), and is a PTFE De Dis version (trade name: Teflon T-30J, Dupont-Mitsui Fluorochemicals, Inc. make) about those textile fabrics.

It was alike, and after making it sink in, it dried, sintered at 380 degrees C, and obtained by repeating this process several times. The reinforcement layer 21 was turned down and they turned the antifriction layer 23 up, said reinforcement layer 21 and antifriction layer 23 made said PFA film 22 intervene between the layer, carried out thermocompression bonding of the vertical layer by the temperature of 380 degrees C, and press ** 0.98MPa, and made the upper antifriction layer endless to make associate and be alike.

[0015]

Carrying out a deer, the heat-resistant laminating conveyor belt concerning the above-mentioned example is formed through the PFA film 22 on the reinforcement layer 21 which dried [sank it in and] and sintered PTFE to the aromatic series aramid fiber base fabric, and this reinforcement layer 21, sinks in, dries and sinters PTFE to the base fabric which carried out Nitto of the aramid fiber, and consists of antifriction layers 23 which gave elasticity. Therefore, compared with the laminating belt produced by the same conventional *****, flexibility is improved markedly, and a life can be improved. In fact, it was made to run the laminating belt concerning the above-mentioned example like drawing 3 by part for an ambient atmosphere with a temperature of 180 degrees C, load 1.5 kN/cm width of face, and belt transit speed 800m/, and the count of fracture crookedness fatigue was investigated. However, in drawing 3 , 31, the drive roll with which, as for 32, the conveyor belt 33 was hung, and 34 show a load pressure roll. Consequently, the count of fracture crookedness was 49856 times. On the other hand, except that antifriction layer textile fabrics were plain weave, it was 465 times, as a result of

producing a laminating belt like an example and investigating the number of fracture crookedness. It is clear that this design is excellent by this compared with the former.

[0016]

[Effect of the Device]

The heat-resistant laminating conveyor belt which can lengthen a life can be offered without the property of original fluororesin spoiling by preparing the antifriction layer which gave elasticity according to this design, as explained in full detail above.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application]

Especially this design is related with the heat-resistant laminating conveyor belt used for a paper feed process about a heat-resistant laminating conveyor belt.

[0002]

[Translation done.]

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PRIOR ART

[Description of the Prior Art]

What carried out the laminating of the same belt base material through the PFA film as a conveyor belt used for the conventional, for example, paper feed, process is known. Moreover, the conveyor belt which carried out the laminating by the application which needs high intensity more than two-layer is used. [0003]

Drawing 4 shows an example of the conventional laminating conveyor belt. 1 in drawing and 2 are the heat-resistant fiber cloth by which the laminating was carried out through the PFA film 3, for example, are the textile fabrics woven for a glass fiber, a carbon fiber, an aramid fiber, and aromatic series ant rate fiber. Said heat-resistant fiber cloth is woven by plain weave, satin, twill, etc. Moreover, it consists of fluororesin which becomes at least the one side from tetrafluoroethylene resin. It has the chemical resistance which was excellent in such fluororesin complex since it had fluororesin, thermal resistance, non-adhesiveness, and abrasion resistance. Moreover, although the belt of the single taste may be used when using it under high tension, it is used, carrying out a laminating more than two-layer.

[0004]

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EFFECT OF THE INVENTION

[Effect of the Device]

The heat-resistant laminating conveyor belt which can lengthen a life can be offered without the property of original fluororesin spoiling by preparing the antifriction layer which gave elasticity according to this design, as explained in full detail above.

[Translation done.]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Device]

When the reinforcement layer which sank into fluororesin dispersion, dried and sintered the heat-resistant fiber textile fabrics woven by the same weave, and an antifriction layer are made into the shape of a two-layer belt which carried out thermocompression bonding, however, according to the difference of the perimeter of a reinforcement layer and an antifriction layer It becomes impossible for an antifriction layer to follow expansion and contraction of a reinforcement layer. With the shearing stress of the interface of a reinforcement layer and an antifriction layer Or heat-resistant fiber textile fabrics and a fluororesin layer cause interfacial peeling with the shearing stress of the antifriction layer itself, the property of original fluororesin is spoiled, and it has the trouble that the life of a belt becomes short.

[0005]

This design was made in consideration of the above-mentioned situation, and it aims at offering the heat-resistant laminating conveyor belt which can lengthen a life by preparing the antifriction layer which gave elasticity, without the property of original fluororesin spoiling.

[0006]

[Translation done.]

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MEANS

[Means for Solving the Problem]

This design is a heat-resistant laminating conveyor belt characterized by providing the antifriction layer which was formed on the reinforcement layer which dried [sank it in and] and sintered fluororesin to the heat-resistant fiber base fabric, and this reinforcement layer, dried [sank it in and] and sintered fluororesin to the base fabric which carried out Nitto of the heat-resistant fiber, and gave elasticity.

[0007]

In this design, as heat-resistant fiber, a glass fiber, a carbon fiber, an aramid fiber, and aromatic series ant rate fiber are especially mentioned, among these a glass fiber and an aramid fiber are desirable.

[0008]

In this design, what mixed the single taste or two sorts or more for the polytetrafluoroethylene (PTFE) and tetrafluoroethylene-perfluoroalkyl vinyl ether copolymer (PFA) and the tetrafluoroethylene hexafluoropropylene copolymer (FEP) can be used as fluororesin.

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OPERATION

[Function]

According to this design, by using the heat-resistant fiber of an antifriction layer as the nonwoven fabric of the shape of Nitto or a wave, and a spring, compared with the laminating belt which gave and had elasticity in the antifriction layer and was produced by the same conventional *****, flexibility is improved markedly, and a life can be improved.

[0013]

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EXAMPLE

[Example]

Hereafter, one example of this design is explained with reference to drawing 1 (A) and (B). Here, the sectional view where drawing 1 (A) meets the top view of a heat-resistant laminating belt, and drawing 1 (B) meets X-X-ray of drawing 1 (A) is shown. 21 in drawing is thickness which dries [sinks it in and] and comes to sinter PTFE to a heat-resistant fiber base fabric. It is a 0.5mm reinforcement layer. After making the aromatic series aramid fiber (trade name: theque NORA, Teijin, Ltd. make) into plain weave and infiltrating those textile fabrics into PTFE dispersion (trade name: Teflon T-30J, Dupont-Mitsui Fluorochemicals, Inc. make), it dried, and this reinforcement layer 21 was sintered at 380 degrees C, and was obtained by repeating this process several times.

[0014]

On said reinforcement layer 21, the antifriction layer 23 with a thickness of 0.5mm is formed through the PFA film 22 with a thickness of 25 micrometers. This antifriction layer 23 makes Nitto an aramid fiber (trade name: theque NORA, Teijin, Ltd. make), and is a PTFE De Dis version (trade name: Teflon T-30J, Dupont-Mitsui Fluorochemicals, Inc. make) about those textile fabrics.

It was alike, and after making it sink in, it dried, sintered at 380 degrees C, and obtained by repeating this process several times.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view where it is the explanatory view of the heat-resistant laminating conveyor belt which starts this design at one example, and drawing 1 (A) meets a top view and drawing 1 (B) meets X-X-ray of drawing 1 (A).

[Drawing 2] The explanatory view of Nitto concerning this design.

[Drawing 3] The explanatory view of the driving test of the heat-resistant conveyor belt of drawing 1 .

[Drawing 4] The explanatory view of the conventional laminating conveyor belt.

[Description of Notations]

21 -- Reinforcement layer 22 -- PFA film 23 [33 -- Conveyor belt 34 -- Load pressure roll.] -- 31 An antifriction layer, 32 -- Drive roll

[Translation done.]

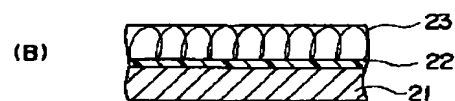
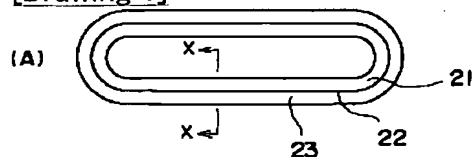
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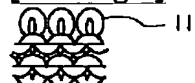
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DRAWINGS

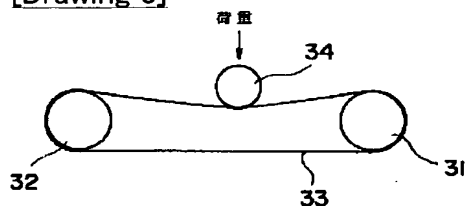
[Drawing 1]



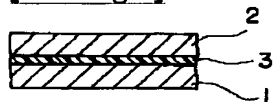
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]